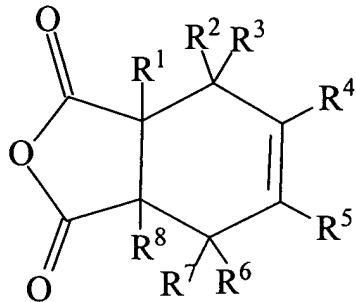


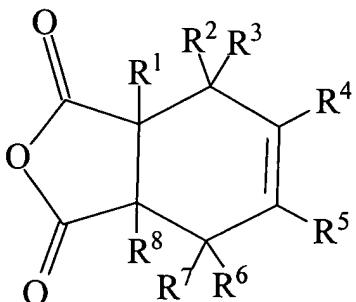
THE INVENTION CLAIMED:

1. Polyimides having improved thermal-oxidative stability derived from the polymerization of effective amounts of at least one polyamine, at least one tetracarboxylic dianhydride and a dicarboxylic endcap having a formula:



wherein R<sup>1</sup> is selected from the group consisting of an alkyl, fluoroalkyl, aryl, fluoroaryl, OR, carboxy, nitro, cyano, R-N-R, SO<sub>3</sub>R, PO<sub>4</sub>R, F and Cl radicals where R is selected from the group consisting of hydrogen, an aryl radical, and an alkyl radical of 1 to 6 carbons; and wherein R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, R<sup>5</sup>, R<sup>6</sup>, R<sup>7</sup>, and R<sup>8</sup> are the same or different radicals selected from the group consisting of hydrogen, alkyl, fluoroalkyl, aryl, fluoroaryl, OR, carboxy, nitro, cyano, R-N-R, SO<sub>3</sub>R, PO<sub>4</sub>R, F and Cl radicals where R is selected from the group consisting of hydrogen, an aryl radical, and an alkyl radical of 1 to 6 carbon atoms.

2. Polyimides having improved thermal-oxidative stability derived from the polymerization of effective amounts of at least one polyamine, at least one tetracarboxylic dianhydride and a dicarboxylic endcap having a formula:



wherein R<sup>2</sup> and R<sup>3</sup> are the same or different radicals selected from the group consisting of alkyl, fluoroalkyl, aryl, fluoroaryl, OR, carboxy, nitro, cyano, R-N-R, SO<sub>3</sub>R, PO<sub>4</sub>R, F and Cl radicals where R is selected from the group consisting of hydrogen, an aryl radical, and an alkyl radical of 1 to 6 carbons; and wherein, R<sup>1</sup>, R<sup>4</sup>, R<sup>5</sup>, R<sup>6</sup>, R<sup>7</sup>, R<sup>8</sup> are the same or different radicals selected from the group consisting of hydrogen, alkyl, fluoroalkyl, aryl, fluoroaryl, OR, carboxy, nitro, cyano, R-N-R, SO<sub>3</sub>R, PO<sub>4</sub>R, F and Cl radicals where R is selected from the group consisting of hydrogen, an aryl radical, and an alkyl radical of 1 to 6 carbons.

10        3.        The polyimide of Claim 1 wherein the dicarboxylic endcap is 2,3-dimethyl-1,2,3,6-tetrahydrophthalic anhydride.

15        4.        The polyimide of Claim 1 wherein the dicarboxylic endcap is 1,3-dimethyl-1,2,3,6-tetrahydrophthalic anhydride.

15        5.        The polyimide of Claim 1 wherein the dicarboxylic endcap is 3,3-dimethyl-1,2,3,6-tetrahydrophthalic anhydride.

20        6.        The polyimides of Claim 1 wherein the polyamine is an aromatic polyamine.

25        7.        The polyimide of Claim 6 wherein the aromatic polyamine is an aromatic diamine.

25        8.        The polyimide of Claim 6 wherein the aromatic polyamine is 4,4'-methylene dianiline.

9. The polyimide of Claim 8 wherein the tetracarboxylic dianhydride is  
3,3',4,4'-benzophenonetetracarboxylic dianhydride.

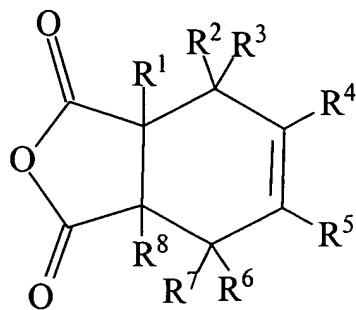
5 10. The polyimide of Claim 9 wherein the dicarboxylic endcap is 2,3-  
dimethyl-1,2,3,6-tetrahydrophthalic anhydride.

11. The polyimides of Claim 2 wherein the polyamine is 4,4'-methylene  
dianiline.

10 12. The polyimides of Claim 11 wherein the tetracarboxylic dianhydride is  
3,3',4,4'-benzophenonetetracarboxylic dianhydride.

13. The polyimides of Claim 12 wherein the dicarboxylic endcap is 2,3-  
15 dimethyl-1,2,3,6-tetrahydrophthalic anhydride.

14. The process of preparing polyimides having improved thermal-oxidative  
stability derived from the polymerization of effective amounts of at least one aromatic  
polyamine, at least one tetracarboxylic dianhydride and a dicarboxylic endcap having a  
20 formula:



wherein R<sup>1</sup> is a radical selected from the group consisting of an alkyl, fluoroalkyl, aryl, fluoroaryl, OR, carboxy, nitro cyano, R-N-R, SO<sub>3</sub>R, PO<sub>4</sub>R, F and Cl radicals where R is selected from the group consisting of hydrogen, aryl radicals and alkyl radicals of 1 to 6 carbons; and wherein R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, R<sup>5</sup>, R<sup>6</sup>, R<sup>7</sup>, and R<sup>8</sup> are the same or different radicals selected from the group consisting of hydrogen, alkyl, fluoroalkyl, aryl, fluoroaryl, OR, carboxy, nitro, cyano, R-N-R, SO<sub>3</sub>R, PO<sub>4</sub>R, F and Cl radicals where R is selected from the group consisting of hydrogen, aryl radicals and alkyl radicals of 1 to 6 carbons.

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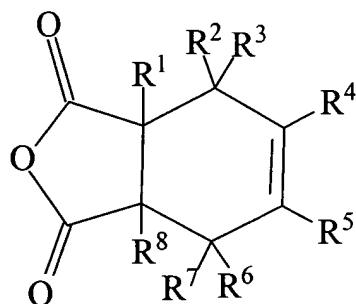
15. The process of Claim 14 wherein the aromatic polyamine is 4,4'-methylene dianiline.

16. The process of Claim 15 wherein the tetracarboxylic dianhydride is 3,3',4,4'-benzophenonetetracarboxylic dianhydride.

17. The process of Claim 16 wherein the dicarboxylic endcap is 2,3-dimethyl-1,2,,3,6-tetrahydronphthalic anhydride.

18. The process of Claim 14 wherein R<sup>2</sup> and R<sup>3</sup> are the same or different radicals selected from the group consisting of alkyl, fluoroalkyl, aryl, fluoroaryl, OR, carboxy, nitro, cyano, R-N-R, SO<sub>3</sub>R, PO<sub>4</sub>R, F and Cl radicals where R is selected from the group consisting of hydrogen, aryl radicals and alkyl radicals of 1 to 6 carbons, and wherein R<sup>1</sup>, R<sup>4</sup>, R<sup>5</sup>, R<sup>6</sup>, R<sup>7</sup>, 5 R<sup>8</sup>, are the same or different radicals selected from the group consisting of hydrogen, alkyl, fluoroalkyl, aryl, fluoroaryl, OR, carboxy, nitro, cyano, R-N-R, SO<sub>3</sub>R, PO<sub>4</sub>R, F and Cl radicals where R is selected from the group consisting of hydrogen, aryl radicals and alkyl radicals of 1 to 6 carbons.

10 19. Fiber-reinforced high-temperature polyimide matrix composites comprising a fibrous material impregnated with an effective amount of a polyimide having improved thermal-oxidative stability; said polyimide derived from the polymerization of at least one polyamine, at least one tetracarboxylic dianhydride and a dicarboxylic endcap having the formula:



15 wherein R<sup>1</sup> is selected from the group consisting of an alkyl, fluoroalkyl, aryl, fluoroaryl, OR, carboxy, nitro, cyano, R-N-R, SO<sub>3</sub>R, PO<sub>4</sub>R, F and Cl radicals where R is selected from the group consisting of hydrogen, an aryl radical, and an alkyl radical of 1 to 6 carbons; and wherein R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, R<sup>5</sup>, R<sup>6</sup>, R<sup>7</sup>, and R<sup>8</sup> are the same or different radicals selected from the group consisting of hydrogen, alkyl, fluoroalkyl, aryl, fluoroaryl, OR, carboxy, nitro, cyano, R-N-R, SO<sub>3</sub>R, PO<sub>4</sub>R, F and Cl radicals, where R is selected from

the group consisting of hydrogen, an aryl radical, and an alkyl radical of 1 to 6 carbon atoms.

20. The composites of Claim 19 wherein the fibrous material comprises

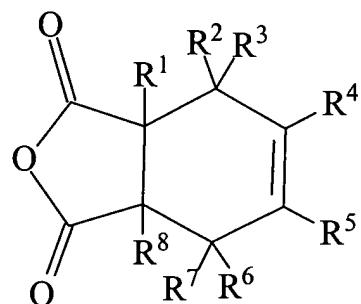
5 carbon fibers.

21. The composites of Claim 19 wherein the fibrous materials comprises

glass fibers.

10 22. A process of preparing a fiber-reinforced prepeg which comprises

impregnating a fibrous material with an effective amount of a polyimide prepolymer derived from at least one polyamine, at least one tetracarboxylic dianhydride and a dicarboxylic endcap having the formula:



15 wherein R<sup>1</sup> is selected from the group consisting of an alkyl, fluoroalkyl, aryl, fluoroaryl, OR, carboxy, nitro, cyano, R-N-R, SO<sub>3</sub>R, PO<sub>4</sub>R, F and Cl radicals where R is selected from the group consisting of hydrogen, an aryl radical, and an alkyl radical of 1 to 6 carbons; and wherein R<sup>2</sup>, R<sup>3</sup>, R<sup>4</sup>, R<sup>5</sup>, R<sup>6</sup>, R<sup>7</sup>, and R<sup>8</sup> are the same or different radicals selected from the group consisting of hydrogen, alkyl, fluoroalkyl, aryl, fluoroaryl, OR, carboxy, nitro, cyano, R-N-R, SO<sub>3</sub>R, PO<sub>4</sub>R, F and Cl radicals, where R is selected from the group consisting of hydrogen, an aryl radical, and an alkyl radical of 1 to 6 carbon atoms.

23. The prepeg obtained by the process of Claim 22.

